

CLAIMS

We claim:

1. An apparatus for testing quantity meter devices, the apparatus comprising:

clamp device for securing a quantity meter;

a variable positive displacement water chamber device in fluid

5 communication with the quantity meter for passing fluid through the quantity meter, wherein the water chamber device has a known volume ;

a motor control device operatively coupled to the variable positive displacement water chamber device such that the motor control device controls the displacement of the fluid from the water chamber device through the quantity

10 meter, the motor control device including a register device operable to selectively determine the amount of fluid dispensed from the water chamber;

an electronic sensor device for measuring an output signal from the quantity meter, where each of the output signals from the quantity meter represent a measurement of the quantity meter; and

15 a calculation device coupled to both the register device and the electronic sensor device, wherein the calculation device is operable to determine a test volume based on the register device and a measured volume based on the output signals from the electronic sensor device.

2. The apparatus of claim 1 wherein the clamp device further comprises a slide plate movable toward and away from the variable positive displacement water chamber device such that the clamp device is adjustable to secure different sized quantity meters.

3. The apparatus of claim 2 wherein the clamp device further comprises a clamp cylinder coupled to the slide plate for moving the slide plate toward and away from the variable positive displacement water chamber device,

wherein the clamp cylinder is operable to exert pressure to force the quantity meter
5 into a fluid tight communication with the water chamber device.

4. The apparatus of claim 3 wherein both the water chamber device and the slide plate include an adapter for receiving the quantity meter, wherein each adapter forms a fluid tight seal with the quantity meter.

5. The apparatus of claim 1 wherein the variable positive displacement water chamber device comprises a cylinder and a piston movable within the cylinder, the cylinder having a known volume.

6. The apparatus of claim 5 wherein the motor control device is operatively coupled to the piston device such that the motor control device moves the piston in the cylinder to displace fluid from the cylinder.

7. The apparatus of claim 6 wherein the motor control device includes a drive motor rotatably coupled to a lead screw, wherein the lead screw is coupled to the piston such that rotation of the lead screw moves the piston along the length of the cylinder to dispense fluid from the cylinder.

8. The apparatus of claim 5 wherein the register device is operable to determine the position of piston within the cylinder.

9. The apparatus of claim 8 wherein the register device monitors the rotation of the motor to determine the position of the piston within the cylinder.

10. The apparatus of claim 5 wherein the calculation device determines the test volume based upon the movement of the piston within the cylinder.

11. The apparatus of claim 1 further comprising a single support device for securing the clamp device, the variable positive displacement water chamber device, the motor control device, and the electronic sensor device.

12. The apparatus of claim 1 wherein the variable positive displacement water chamber device includes a fluid inlet for receiving a supply of fluid, the supply of fluid being discharged from the water chamber device through the quantity meter.

13. An apparatus for testing quantity meter devices, the apparatus comprising:

- a clamp device for securing a quantity meter;
- a variable positive displacement water chamber device in
- 5 communication with the quantity meter being tested, the water chamber device being operable to pass fluid through the quantity meter, wherein the variable positive displacement water chamber device includes a piston movable within a cylinder, the cylinder having a known volume;
- 10 a motor control device operable to move the piston within the cylinder, the motor control device being operatively coupled to the piston such that when force is applied to the piston, the piston moves within the cylinder to displace fluid from the cylinder and through the quantity meter, when the motor control device includes a register operable to determine the position of the piston within the cylinder;
- 15 an electronic sensor for measuring an output signal from the quantity meter, the electronic sensor being operatively coupled to the motor control device to transmit signals to the motor control device, wherein each signal represents a measurement of the quantity meter; and
- 20 a calculation device for determining a test volume from the register device and a measured volume based on the signal from the electronic sensor device.

14. The apparatus of claim 13 wherein the clamp device further comprises a slide plate movable toward and away from the variable positive displacement water chamber device such that the clamp device is adjustable to secure different sized quantity meters.

15. The apparatus of claim 14 wherein the clamp device further comprises a clamp cylinder coupled to the slide plate for moving the slide plate toward and away from the variable positive displacement water chamber device, wherein the clamp cylinder is operable to exert pressure to force the quantity meter 5 into a fluid tight communication with the water chamber device.

16. The apparatus of claim 15 wherein both the water chamber device and the slide plate include an adapter for receiving the quantity meter, wherein each adapter forms a fluid tight seal with the quantity meter.

17. The apparatus of claim 13 wherein the motor control device includes a drive motor rotatably coupled to a lead screw, wherein the lead screw is coupled between the drive motor and the piston such that rotation of the drive motor moves the piston along the length of cylinder.

18. The apparatus of claim 13 wherein the variable positive displacement water chamber device includes a fluid inlet for receiving a supply of fluid, the supply of fluid being discharged from the water chamber device through the quantity meter.

19. The apparatus of claim 13 wherein the register device is coupled to the drive motor such that the register device monitors the rotation of the drive motor.

20. The apparatus of claim 13 further comprising a support device for securing the clamp device, the variable positive displacement water chamber device, the motor control device and the electronic sensor device.

21. The apparatus of claim 13 wherein the quantity meter is a water meter.

22. A method for testing quantity meters, the method comprising steps of:

- securing a quantity meter to a clamp device;
- moving the quantity meter into fluid communication with a variable
- 5 positive displacement water chamber device, wherein the variable positive displacement water chamber device includes a piston movable within a cylinder, the cylinder having a known volume;
- filling the cylinder with the known volume of fluid;
- advancing the piston by activating a motor control device coupled to
- 10 the piston, wherein when force is applied to the piston, the piston displaces fluid from the cylinder through the quantity meter;
- monitoring the position of the piston within the cylinder such that a test volume can be determined;
- 15 positioning an electronic sensor to measure an output signal of the quantity meter as fluid is passed through the quantity meter, wherein the electronic sensor is coupled to the motor control device and transmits signals to the motor control device;
- determining a measured volume of fluid that has passed through the quantity meter based upon the signals from the electronic sensor; and
- 20 comparing the determined measured volume to the determined test volume.

23. The method of claim 22 further comprising the step of positioning the quantity meter in the clamp device and moving the clamp device to engage the quantity meter with the variable positive displacement water chamber device.

24. The method of claim 23 wherein the clamp device includes a clamp cylinder, the clamp cylinder being extendable and retractable to move the quantity meter toward and away from the variable positive displacement water chamber device.

25. The method of claim 22 wherein the motor control device includes a drive motor and a lead screw, the lead screw being positioned between the drive motor and the piston such that rotation of the drive motor advances the piston along the cylinder.

26. The method of claim 22 further comprising the steps of:
determining the position of the cylinder upon receiving a first output signal from the electronic sensor;
determining the position of the piston upon receipt of a second output signal from the electronic sensor;
determining a test volume based upon the movement of the piston within the cylinder and the known volume of the cylinder; and
determining the measured volume based upon the first and second test signals received from the quantity meter.

27. The method of claim 22 further comprising the step of securing the clamp device, the variable positive displacement water chamber device, the motor control device and the electronic sensor to a single support device.

28. The method of claim 22 wherein the step of inserting fluid into the cylinder includes opening an inlet valve to supply fluid to the cylinder, wherein the inlet valve presents the discharge of the fluid through the inlet valve.

29. The method of claim 22 wherein the step of securing the quantity meter to a clamp device comprises inserting the quantity meter into a first adapter formed on the variable positive displacement water chamber device and a second adapter formed on the clamp device, wherein each of the adapters provide a 5 fluid tight seal with the quantity meter.

30. The method of claim 22 wherein the quantity meter is a water meter and the fluid is water.